Streamlined Approach for Environmental Restoration (SAFER)

PILOT PROJECT

FINAL REPORT

Department of Energy
Environmental Protection Agency
Washington, DC

MEMORANDUM FOR DISTRIBUTION

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Timothy Fields, Jr.

SUBJECT: Distribution of the Measures of Success of the Streamlined Approach for Environmental Restoration Pi 1 ot Projects Report

In February of 1993, the Department of Energy and the U.S. Environmental Protection Agency agreed to jointly pilot the Streamlined Approach for Environmental Restoration at several sites within the Department of Energy complex. Subsequently, operable units at Savannah River, Oak Ridge, Mound, and Hanford were selected as the Streamlined Approach for Environmental Restoration pilot projects. The attached report summarizes the results of the pilots through the end of fiscal year 1995.

The Department of Energy and the U.S. Environmental Protection Agency believe that the pilot projects were successful in demonstrating that Department of Energy, U.S. Environmental Protection Agency, and State personnel could work together to reduce the timelines and costs associated with various remediation projects. The attached report reproduces letters from State and U.S. Environmental Protection Agency Regional staff indicating the success of the pilots, and several regulators have stated that they expect future environmental restoration projects at the pilot facilities to be conducted using the Streamlined Approach for Environmental Restoration process. Additionally, Department of Energy Headquarters has stated that the Streamlined Approach for Environmental Restoration principles should be applied to all of the Department's environmental restoration efforts and has requested that each of its Operations Offices nominate a person to champion the use of the process. This person should, of course, coordinate closely with regulators and other stakeholders.
A listing of the champion for each Operations Office is attached.

The success of the Department of Energy's environmental restoration efforts rests on its ability to work as partners, using all the tools at its disposal to reduce risk to human health and the environment as quickly and as efficiently as possible. Certainly the streamlined Approach for Environmental Restoration, based on the results of the pilot projects, is one such tool. Therefore, we strongly encourage the broadest application of its principles

For more information on the Streamlined Approach for Environmental Restoration or to request additional copies of the attached report, please contact Claude Magnuson, Department of Energy Headquarters, at (301) 903-7651. The U.S. Environmental Protection Agency's Headquarters contact is Marianne Lynch, who may be reached at (202) 260-5686.

Attachments

Streamlined Approach for Environmental Restoration (SAFER)

PILOT PROJECT

FINAL REPORT

EXECUTIVE SUMMARY

In conjunction with EPA, DOE initiated SAFER pilot projects at four DOE facilities: Savannah River, Oak Ridge, Mound, and Hanford. Measures of success are summarized below.

SAFER PILOT PROJECTS

Savannah River Site - *F-Area and H-Area Retention Basins*

- Use of Data Quality Objectives (DQOs) and stakeholder participation facilitated use of innovative technologies and streamlined data collection and analysis, resulting in reduced sampling locations and avoided sampling characterization costs of $750,000 (97% cost savings).
- Stakeholder participation allowed the regulators to feel comfortable using a computer generated model (RESRAD), which limited the number of contaminants of concern and avoided $450,000 in additional analytical costs. Use of the RESRAD model is now being applied to other sites at SRS, resulting in significant potential savings.
- Stakeholder partnering resulted in regulators attending monthly scoping meetings on all SRS projects.

Savannah River Site - *D-Area Oil Seepage Basin*

- Incorporation of the Expedited Site Characterization (ESC) allowed the Remedial Investigation (RI) to begin in June, 1995, about five months before the scheduled start date. The initial ESC field work was done without an approved work plan, due to regulatory stakeholders working closely with the project team.
- The ESC RI field work was completed in four months, rather than the 11 months generally scheduled for field work at SRS, for a total savings of 12 months attributable to incorporating the ESC into the SAFER pilot project.
- The SRS team is combining the RI and FS report, and has taken on the goal of reducing the overall schedule from the end of the RI field work to the Record of Decision by nine months.

Oak Ridge National Laboratory (ORNL) - *WAG 1 Surface Impoundments*

- The combined RI/FS was submitted to the regulators for review in May 1995, one year earlier than originally scheduled. ORNL estimates that at least $2.6 million in cost savings resulted from the streamlined approach (i.e., merger of the RI and FS, and focus of the data collection effort).
- Regulator attendance in project meetings has been extended formally to all restoration projects at ORNL.

Mound - *Building Solvent Storage Shed*

- Development of a conceptual model that separated the shed demolition from the soil removal activities resulted in at least four months savings.
- Uncertainty analysis eliminated the planned site characterization, resulting in cost savings of $88,000 (54% cost savings) and project completion at least six months early.
- A contingency plan developed for the soil remediation removal action was implemented without a work stoppage.

Mound - *Area 7 Actinium Contaminated Soil Removal*

- The conceptual model refocused the project from tank removal to contaminated soil removal.
- Uncertainty analysis was used to eliminate the planned site characterization, saving $300,000.

Mound - *New Properties Transfer*

- Decision rule logic demonstrated that the previously collected data were sufficient to show the property was clean enough to transfer; additional data collection was unnecessary.
- The land transfer strategy is being implemented for the balance of the targeted property.

Hanford - *100-BC-1*

- Using conceptual models, contingency planning, and active regulator involvement, the 100-BC Area was successfully transitioned from the RI/FS stage to the RD/RA stage of the response; initial remedial activities began on an accelerated schedule with a removal action in June, 1995.
- The regulators were successfully integrated as active participants on the Extended Project Team, creating an atmosphere that enabled real-time decision-making. Hanford estimates that between February and June, 1995, at least two months and $200,000 were saved because of increased efficiency and teamwork facilitated by the SAFER technical team.
- The SAFER tenet of early stakeholder involvement in the decision-making process has been formally extented to the entire 100-BC Area.

OTHER NON-PILOT SAFER PROJECTS

Hanford 118-B-1 Burial Ground Treatability Study

- After a contentious year, integration of the regulators into the project team enabled development within 5 days of a SOW with specified data requirements and objectives; excavation began within 8 months and the test report was accepted by the regulators without changes.

Ventron Site (FUSRAP)

- The site characterization plan resulted in a 50 percent reduction in the number of samples and analyses, and a commensurate reduction in the cost of site characterization.

OR Y-12 Bear Creek Valley Site

- The conceptual model, decision rules, and contingencies enabled the project team to maximize use of existing data and accept and effectively manage higher levels of uncertainty. OR estimates that $10.3 million was saved over four years (25% cost savings), and the remediation schedule was reduced by at least two years (13%).

REGULATORS' RESPONSE

- *SAFER is an effective communication tool. It provides an opportunity for regulators to really understand what DOE is doing and why.* Dennis Faulk, EPA RPM Region 10.

- *SAFER is a smart way to do business. It has had a good impact thus far.* Ed Carraras, EPA RPM Region 4.

- *The SAFER process resulted in better data, better decisions, and better solutions.* Keith Collinsworth, SCDHEC.

- *SAFER removes politics from the decision-making process. It builds team spirit and provides an opportunity to voice concerns.* Ted Wooley, Washington Dept. of Ecology.

- *EPA views the DOE SAFER concept as a successful approach to environmental restoration activities.* Jon D. Johnston, Federal Facilities Branch Chief, EPA Region 4.

SAFER PILOT PROJECTS
FINAL REPORT

January 1996

1. INTRODUCTION

Traditional approaches to environmental restoration can be very time consuming and can apply resources inefficiently. In an atmosphere of severe budget reductions and high visibility, DOE is under increasing pressure to streamline its environmental restoration process while remaining in compliance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and other applicable regulations promulgated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

The Department of Energy (DOE) developed the Streamlined Approach for Environmental Restoration (SAFER) to help address the challenges of environmental restoration conducted under conditions of significant uncertainty and to help reduce the time and resources traditionally required to cleanup a hazardous waste site. SAFER integrates the strengths of the Observational Approach and the Data Quality Objectives (DQOs) process developed by the U.S. Environmental Protection Agency (EPA) to form a comprehensive methodology. The five essential elements of SAFER are:

- Use of a dynamic conceptual model as the foundation for remedial planning and action;
- Early convergence on the exact problem(s) that are to be solved;
- Reliance on a "learn-as-you-go" approach enabling a bias for action;
- Incorporation of specific techniques to optimize technical management and reduce uncertainty (i.e., decision rules, reasonable deviations, contingencies); and
- Explicit recognition of the need for stakeholders to be involved in decision-making throughout the project.

The DQO process defines the problem and action requiring attention, and defines the type and quality of data needed for problem resolution. The Observational Approach provides the operational framework for managing uncertainty and planning decisions. Regulator involvement in all key decisions and increased communication among all the participants enable project teams to identify acceptable remedial alternatives to specific problems, including decision rules and contingencies, that address the exposure pathways and contaminants of concern, and reduce the likelihood that extensive revisions and rethinking will be needed over time.

2. STREAMLINING EFFORTS AT DOE

Different aspects of the SAFER process have been in use for several years throughout the DOE complex and at other hazardous waste sites throughout the nation. For example, the DQO approach was originally developed and used by EPA in environmental data quality assurance. EPA has published several guidance documents on the DQO approach. The Observational Approach is a basic geotechnical engineering technique. The name was first associated with the technique more than 25 years ago, and EPA has published several directives that discuss implementing the approach during environmental restoration projects.

SAFER is unique, however, in that it integrates the DQO and Observational Approach, adding the dimension of early and active regulator involvement, to formalize a dynamic method for addressing the challenges of uncertainties inherent in environmental restoration. Active regulator involvement at staff project meetings is critical to the formation of an effective Extended Project Team, where regulators, DOE, and site contractors have an opportunity to be introduced to the site details and challenges, can identify issues and raise concerns at critical junctures, and can help formulate a solution.

SAFER operates in an aggressive, yet cost-effective and efficient manner that complies with existing environmental regulations and is consistent with Federal Facility Agreements (FFAs) and Consent Orders. It is applicable to both the characterization stages and the design and implementation stages of the response, and can be used within a CERCLA or RCRA regulatory context.

> *SAFER is an effective communication tool. It brings in different view points and enables the Extended Project Team to reach a consensus. It provides an opportunity for regulators to really understand what DOE is doing and why.*
> Dennis Faulk, EPA RPM Region 10

3. DEVELOPMENT OF SAFER AT DOE

The SAFER approach to environmental restoration is the product of a collaborative effort by four different offices within DOE: the Office of Environmental Policy and Assistance [EH-41] within the Environment, Safety and Health organization; and the Office of Environmental Restoration [EM-40], the Office of Transportation, Emergency Management and Analytical Services [EM-76], and the Office of Environmental Activities [EM-22] within the Environmental Management organization. DOE has worked for several years to develop and continually improve the SAFER process, providing workshops to disseminate the concepts, and helping to implement SAFER at various sites.

In 1992, DOE approached EPA with the idea of testing SAFER on a pilot scale. The primary objectives of the pilot study would be to (1) implement and evaluate SAFER at DOE sites, and identify reactions, both positive and negative, by DOE field personnel, contractors, and stakeholders to implementing SAFER broadly throughout the DOE complex; and (2) teach SAFER to DOE field management and contractors so that the SAFER tenets may successfully be applied at other DOE sites.

EPA agreed to jointly pilot SAFER, but requested that DOE nominate pilot sites that satisfied the following criteria:

- The pilot projects must be part of National Priorities List (NPL) sites.
- DOE, EPA, and cognizant State authorities must all agree on candidate projects.
- The DOE Field Office must have signature authority for primary deliverables, including proposed plans and Records of Decision.

DOE agreed, and in January 1994, the DOE Deputy Assistant Secretary for Environmental Restoration selected four DOE facilities to host the SAFER pilot projects: Savannah River Site (SRS) in South Carolina; Oak Ridge National Laboratory (ORNL) in Tennessee; Mound Plant in Ohio; and Hanford in Washington. ORNL and Hanford each hosted one SAFER pilot; SRS hosted two SAFER pilots; and Mound hosted three SAFER pilots. The SAFER pilot projects were conducted at varying stages in the remedial process: the Mound pilot projects included two removal actions and one land transfer, while the other pilot projects were in the remedial investigation/feasibility study (RI/FS) stage or the remedial design/remedial action (RD/RA) stage of the response.

4. LESSONS LEARNED FROM THE PILOTS

In general, DOE project managers, M&O contractors, and Federal and State regulators agree that the use of SAFER has succeeded in improving the way DOE has traditionally performed its environmental response activities. In the course of piloting SAFER, however, some very valuable lessons were learned; they are summarized below.

♦ SAFER's ultimate success depends upon having a "champion" to drive the process on each project. It is essential that someone at each site be available to maintain the focus and momentum, and to carry through on decisions. Without DOE field acceptance and ultimate implementation by the field team, none of the accomplishments attributed herein to SAFER would have been realized. In addition, the degree to which the regulators are involved contributes greatly to the success of the project.

♦ Consensus building, a crucial part of SAFER, can be a frustrating and time consuming process. However, investment upfront at the scoping stage of a project will generally yield

> *For SAFER to be successful in the long run, there must be resistance to the ever-present urge to take shortcuts in the scoping process.*
> Harry Boston, Lockheed Martin

significant savings later in terms of shorter review and revision cycles and a final product that satisfies everyone's concerns. Project meetings should be sufficiently documented so that valuable time is not lost in rethinking issues that had been resolved previously.

- ♦ The full benefits of SAFER will not be realized if the success of streamlining the data collection and analysis process is not translated into schedule reductions. Time savings are more important generally than cost savings to the regulators at DOE sites, because their primary function is to get results quickly. They may be unwilling to continue to invest significant time upfront in the scoping and characterization stages of the response if savings are not translated into faster remediation.

- ♦ The DOE budget process makes long term planning and use of contingencies difficult, and generally does not reward efficiency. In one case, budgetary uncertainties distorted the decision-making process and caused the site team to be unwilling to commit to accelerating the schedule with respect to the FFA milestones. Several regulators also expressed strong concern and frustration over the DOE budget process . SAFER would be easier to implement throughout the complex if the budgetary process was more flexible and predictable.

5. PILOT SUMMARIES

Each of the pilot projects described below have been supported by a technical team of experts in the CERCLA response process. The SAFER technical team played the role of advisors to DOE field management and their supporting contractor teams. DOE Headquarters spent $1.4 million in conducting the SAFER pilots. These expenditures generally covered the costs for travel to the different sites by the SAFER technical team and the time devoted by the team to scoping and implementation activities at the sites.

5.1 SAVANNAH RIVER SITE

The Savannah River Site (SRS) had two SAFER pilot projects at the RI stage of a CERCLA response action: the F-Area and H-Area Retention Basins, and the D-Area Oil Seepage Basin. The scope and results of each pilot are discussed separately below.

F-Area and H-Area Retention Basins

Site Description

The F-Area Retention Basin (FARB) and H-Area Retention Basin (HARB) were designed to receive contaminated cooling water caused by radiological separation system upsets resulting from cooling system leaks. The contaminated cooling water was delivered from the separations operations complex to the unlined basins through large diameter (24 - 36 inch) process pipelines.

The FARB process pipeline is approximately 2,000 linear feet; the HARB process pipeline is approximately 3,000 linear feet. Part of the HARB process line is still operational, however, and all but 60 feet of the line is outside the scope of the pilot project.

FARB and HARB were operational for more than three decades. Releases to the environment occurred in the basins and potentially at leaks along the process pipelines. On a few occasions, the basins overflowed and released volumes of contaminated cooling water into nearby streams. The primary contaminants of concern are radionuclides, specifically Cs-137 and Sr-90.

Use of FARB and HARB was discontinued in the late 1970s when cooling water upsets were diverted to a new lined retention basin. The contaminated soils and sludge from the FARB were excavated at that time in compliance with the environmental restoration standards of the 1970s. Data collected during the original cleanup of FARB suggested that Sr-90 and Cs-137 had migrated into the soils underlying the basins. Although data show that Sr-90, the more mobile of the two radionuclides, had migrated about two meters into the soil column, the threat to groundwater at FARB appears to be minimal because groundwater levels are 16 to 20 meters below the surface level.

Unlike FARB, HARB has not been previously excavated, and vegetation and trees now cover the basin and surrounding berm. Access to the HARB and overflow areas is restricted to minimize exposure to high radionuclide concentrations, which are estimated to be greater than 10 mrem/hr at several locations. At times, the HARB contains standing water, reflecting the relatively high groundwater level (i.e., 3 to 4 meters below the surface).

Remediation Progress

When the pilot began at this site, SRS had compiled an extensive list of potential contaminants of concern and sought help in developing a streamlined site characterization plan that would successfully identify the true contaminants of concern and areas of contamination.

- Early stakeholder involvement facilitated the use and acceptance of the RESRAD model to estimate the migration of radioactive contaminants through soil. Through use of RESRAD, DOE was able to significantly reduce the number of radioactive contaminants of concern.

- Similarly, consensus building and integration of the regulators in early project scoping meetings facilitated the use of innovative technologies, including a robotic pipecrawler and a hydropunch. The pipecrawler remotely photographed the process pipeline, identifying potentially contaminated areas (e.g., areas near pipeline joints and cracks). The hydropunch facilitated the collection of soil and water samples. Following the tenet of stakeholder participation, all interested parties were able to talk about and feel more comfortable with the use of the innovative technologies.

- The fact that State and EPA regulators were active participants in the early decision-making stages of this pilot afforded timely and valuable insights into their issues and concerns, allowing the project team to refocus their activities and limit false starts.

- Based on the derived limited list of contaminants of concern, three separate sampling plans were developed: the HARB sampling plan was used to define the boundaries and magnitude of contamination; the FARB plan focused on confirmatory sampling and boundary determination; and the process pipeline plan primarily focused on areas of concern identified by the pipecrawler.

> *The upfront investment of time resulted in a better (more efficient/less costly) RI. Although funds were cut and the overall schedule was not shortened, the process resulted in better data, better decisions, and better solutions.*
> Keith Collinsworth, SCDHEC

- Budgetary cuts independent of the pilot caused activities at FARB and HARB to be discontinued after the work plans were completed; no further activities have been scheduled at the basins. Data were collected and analyzed according to the sampling and analysis plans described above, but no results have been circulated to date and the remedial alternatives have not been fully scoped.

Measures of Success

- Uncertainty analysis allowed DOE to eliminate characterization of groundwater and the berm around HARB. DOE conceded that there was extensive contamination, and additional characterization would add little if anything to the remedy selection process and would needlessly expose workers to high doses of radiation.

> *We made more progress in the one DQO meeting on FARB and HARB than we made in all our other efforts last year.*
> Carl Froede, EPA RPM Region 4

- Development of decision rules and consensus building in stakeholder meetings created a forum that facilitated the use of innovative technologies and allowed DOE to minimize the number of samples taken around the FARB process line. By developing a reasonable and technologically innovative approach to identifying potential areas of concern, DOE was able to limit the number of samples to those around man-hole covers and pipe areas shown by the pipecrawler to be disconnected.

- SRS estimates that use of the robotic pipecrawler alone resulted in a reduction in the number of sampling locations from 325 to 11; about $750,000 in site characterization costs were avoided.

- Use of the RESRAD computer model enabled the site team to limit the number of contaminants of concern, reducing analytical costs by as much as $450,000. Application of the RESRAD model has been extended to other applicable sites at SRS, resulting in a significant potential for additional cost savings.

- The work plans were submitted to the regulators on schedule and within budget. They were returned to DOE within six weeks with only minor editorial comments that could easily and quickly be incorporated into the final documents.

- SCDHEC acknowledged that State soil cleanup levels had not existed prior to the pilot, and there were no national guidelines. The lack of cleanup levels slowed down the remediation process and frustrated decision-making. The pilot forced SCDHEC to develop soil cleanup levels that could be used as cleanup goals for CERCLA actions, RCRA Corrective Actions, tank removals, etc, improving the efficiency of all response actions at SRS.

- Scoping work plans with the regulators, developing conceptual models, creating contingencies and decision rules, etc., are now part of standard operating procedures at SRS.

> *It has become a habit to do things the SAFER way at SRS -- even if it's not always called SAFER.*
> Keith Collinsworth, SCDHEC

- The State regulators believe that SAFER creates a process that results in a significant improvement in their understanding of the issues, facilitates early decision-making, and encourages consensus building. The State and EPA are very receptive to continuing the implementation of SAFER at SRS.

D-Area Oil Seepage Basin

Site Description

The D-Area Oil Seepage Basin is in the RI stage of a CERCLA response. Constructed in 1952, the basin is a 40,000 sq. ft. area containing at least three unlined 8-ft. deep trenches that were used for disposal of waste oil from D-Area powerhouse operations, nonburnable waste (e.g., paint cans, drums, metal objects, and concrete), and burnable solid waste (e.g., office trash and cafeteria waste). Waste oil was poured into the trenches and burned periodically, along with other waste, until 1973, when open burning ceased plant-wide.

In 1975, the D-Area Oil Seepage Basin was removed from service and backfilled with soil. Approximately one foot of standing liquid and an unknown number of 55-gallon drums remained in the basin when it was filled. Historical soil samples indicate the presence of volatile organic compounds, semi-volatile organic compounds, and metals.

Groundwater elevations fluctuate seasonally within the basin; the groundwater is within the trenches during periods of high water, and can be six feet below the bottom of the trenches during periods of low water. A "Carolina bay" and a wetlands area are present within 200 feet of the basin. Compounds detected to date in the four groundwater monitoring wells include volatile organic and inorganic compounds.

Prior to the acceptance of the D-Area Oil Seepage Basin as a SAFER pilot, the site had planned an Interim Action for the Spring of 1995 that had a relatively narrow scope: removal of 55-gallon drums in the basin and replacement of the disturbed soil back into the trenches. Limited data collected in 1993 revealed no high risks from the soil; therefore, after removing the drums, SRS planned to put the soil back in the basin without further analysis.

Remediation Progress

- The Interim Action was postponed because of inclement weather and high water tables. SRS proceeded with the previously planned Expedited Site Characterization (ESC).

- The regulators and the project team agreed to a bifurcated sampling plan for the basin, separating the soil characterization into the vadose zone (defined to be ground surface to four ft. depth) and the saturated zone (defined to be soil below four feet). This bifurcation enabled the project team to focus on areas of concern (i.e., residents and groundwater contamination, respectively).

- Articulation of the conceptual site model helped regulators to agree that it was inappropriate to use preliminary remediation goals (PRGs) as decision thresholds for contaminants in soil below four feet in depth. Instead, it was agreed that ESC would be used in two stages to characterize soils in the saturated zone. Phase 1 would determine if the contaminants in the saturated zone continue to be a source of groundwater contamination; if so, Phase 2 would determine if the rate of leaching poses an unacceptable risk.

Measures of Success

♦ Incorporation of the ESC into the pilot project allowed the RI investigation to begin in June, 1995, about five months before the scheduled start date. The initial ESC field work was done without an approved work plan, due to regulatory stakeholders working closely with the project team.

♦ The ESC RI field work was completed in four months, rather than the 11 months generally scheduled for field work at SRS. The RI work plan was based on the problem, decisions, and decision rules formulated by the SAFER technical team.

- ♦ The SRS team is combining the RI and FS report, and has taken on the goal of reducing the overall schedule from the end of the RI field work to the Record of Decision by nine months.

- ♦ The different elements of the soils sampling plan focused on the potential exposure pathways identified in the conceptual model (i.e., contaminated surface soil and the potential to contaminate groundwater). The sampling approach designed for the wetlands/surface water would confirm the existence of a problem prior to designing an extensive investigation of the area.

- ♦ SRS has committed to do a preliminary scoping of the FS between the two phases of the ESC so that FS data needs can be incorporated into the data collection activities planned for phase 2.

5.2 OAK RIDGE NATIONAL LABORATORY (ORNL)

Waste Area Group (WAG) 1 Surface Impoundments

Site Description

The ORNL SAFER pilot began at the RI/FS stage of a CERCLA response action. The pilot project focused on the WAG 1 surface impoundments, which consist of two lined and two unlined surface impoundments located adjacent to a stream in the highly industrialized main plant area of ORNL. The surface impoundments were used to store liquid, low-level, mixed wastes that were generated during ORNL operations in 1945 through 1976.

Substantial historical data on the impoundments were available prior to the onset of the pilot. The data document historical operational activities, and historical and recent groundwater, soil, and sediment sampling in the vicinity of the impoundments and adjacent areas. The surface impoundments are underlain by contaminated groundwater and one impoundment is in contact with the bedrock. Continued release of contaminants from the unlined impoundments into the groundwater and surface water is a virtual certainty.

The impoundments are contaminated with radionuclides, including Sr-90 and tritium, which are of particular concern because of their mobility in groundwater. Pu-239, Pu-240, Cs-137, and other radionuclides are contained in the sludge and sediments. U-233 may be present in the impoundments, but its presence has not been documented through analysis. PAH, heavy metals, and polychlorinated biphenyls are also contained in the impoundments.

Remediation Progress

- ORNL has been using DQOs and the Observational Approach independently for many years. There was little resistance, therefore, to integrating the two approaches under SAFER. All participants were very receptive and willing to work with the SAFER technical team.

- Coordination was a potential problem at OR because many different contractors are involved in each of the remedial stages. The SAFER technical team facilitated communication among the different project contractors, minimizing potential schedule slippages and facilitating the integration of the RI and the FS.

- Initially, the Tennessee regulators became fully integrated members of the project team. A State regulator attended all project staff meetings, and provided valuable insight into the specific type of information the State wanted to see in the RI/FS to enable them to fully evaluate the remedial alternatives under consideration. State participation at the working level fostered a greater understanding of the issues and concerns of the State, the public, and DOE, and created a cooperative working relationship that minimized confrontations and maximized consensus building. Unfortunately, about two-thirds into the pilot project, the State regulator who had been attending the pilot project staff meetings left the Oak Ridge office and was not replaced.

- The conceptual model helped establish a common understanding of the mission through early development of the problem statement and remedial objectives, and continual reevaluation of the model in response to changing information.

> *Sometimes at a DOE site, the letter of the law obscures the intent of the law. SAFER helps us do what makes sense.*
> Elizabeth Krispen, ORNL Project Manager

- Uncertainty analysis enabled the site project team to identify a limited set of data needed to analyze the feasibility of remedial alternatives, and to eliminate collection of all other data or postpone the collection until the design stage of the remediation.

Measures of Success

> *For SAFER to be successful, the project team must be able to manage change and document how decisions were reached. They must be willing to learn as they go, with continuous team involvement and updates.*
> Harry Boston, Lockheed Martin

♦ The bias for action created a working atmosphere that allowed DOE to produce a streamlined RI/FS, eliminating development of a full RI work plan and avoiding review cycles and redundancies inherent in separate

RI and FS reports. The scoping workshops resulted in a focused and abbreviated RI work plan, and facilitated early initiation of field work.

♦ The RI/FS was submitted to the regulators for review in May 1995, one year earlier than originally scheduled. ORNL estimates that at least $2.6 million in cost savings resulted from the streamlined approach (i.e., merger of the RI and FS, and focus of the data collection effort).

5.3 MOUND

The Mound Plant hosted three SAFER pilot projects. Two of the projects were removal actions: (1) the B Building Solvent Storage Shed and (2) Area 7 Actinium Contaminated Soil Removal. Because these projects were removal actions, regulator involvement was minimal; however, Mound has decided to rely on the SAFER concepts to help establish priorities for remediation and will involve the regulators and introduce them to SAFER. The third project, New Properties Transfer, was a land transfer project. Each pilot is discussed below.

> *SAFER has never been adequately explained to this regulating body. There is confusion as to what SAFER means and what it is supposed to accomplish.*
> Doug McCoy, TDEC

> *July 26, 1995*
>
> *James M. Owendoff, Acting Deputy*
> *Assistant Secretary, Environmental Restoration*
> *1000 Independence Avenue, SW*
> *Washington, D.C. 20585*
>
> *Re: Streamlined Approach for Environmental Restoration*
>
> *Dear Mr. Owendoff:*
>
> *The Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC) recently participated in a meeting held in Salt Lake City, Utah, where we discussed the Department of Energy (DOE) Environmental Remediation special initiative Streamlined Approach for Environmental Restoration (SAFER). Several of these SAFER projects occurred in EPA Region 4. We discussed the success of this approach and shared in the lessons learned from the various projects. EPA and the various states have worked with DOE in applying the SAFER concepts at both the Oak Ridge Reservation and Savannah River Site (SRS).*
>
> *EPA views the DOE SAFER concept as a sucessful approach to environmental restoration activities. Additionally, at a recent SRS Workout meeting held in Rock Hill, S.C., the DOE SAFER approach was identified as a positive way of streamlining environmental investigation and cleanup. We will continue to support DOE initiatives which show both time and cost savings. It is our hope that you will continue to encourage the implementation of concepts such as SAFER in environmental restoration activities.*
>
> *Sincerely,*
> *Jon D. Johnston, Chief*
> *Fed. Facilities Branch*

B Building Solvent Storage Shed

Site Description

The B Building solvent storage shed pilot included the demolition of the shed and remediation of contaminated soil in a 5,500 square foot area. Historically, the B Building storage shed was used to store waste and product-grade solvents from B Building. Waste solvent was pumped into 55-gallon drums from

B Building through discharge hoses equipped with automatic shutoff devices. The drums were then sealed and stored in the shed. Prior to construction of the storage shed, solvents were stored in 5-gallon cans inside the B Building and in 55-gallon drums in an outdoor storage area located adjacent to the shed.

The scope of the original removal action called for complete site characterization, removal of the shed, and use of soil vapor extraction (SVE) to remove the contaminants from the soil. One of the reasons for the characterization effort was to focus on determining the depth to bedrock to ensure the feasibility of the SVE technology.

Remediation Progress

- The conceptual model and matrix of probable conditions, possible deviations, and contingencies were used to demonstrate that there was no need for further site characterization prior to beginning the SVE. A simple and cost-effective contingency plan was identified that could be implemented quickly in the field if it was determined that the depth to bedrock was insufficient for the SVE system to operate effectively at certain wellheads.

- The conceptual model helped the project team separate demolition of the shed from remediation of the soil. By separating the demolition from other aspects of the removal action, on-site staff could be utilized and typical on-site D&D procedures followed to remove the shed. This enabled the removal action to focus on contamination issues in the soil.

- Both EPA and the State of Ohio have determined that the B-Area soil is sufficiently clean; the removal action is complete.

Measures of Success

- Because the solvent shed was separated from the soil remediation, implementation of SVE operations could be accelerated by at least four months.

- Mound estimates that elimination of the planned site characterization and integration of the design and characterization stages of the response resulted in a cost savings of $88,000 (54 percent of the original cost proposal), and completion of the project at least six months ahead of schedule.

- Based on uncertainty analysis, a contingency plan was implemented during the SVE operations to address lower than optimal depths to bedrock. The plan was implemented without any delays or work stoppages.

Area 7 Actinium Contaminated Soil Removal

Site Description

Mound's Area 7 was historically used to deposit construction debris, thorium drums, and other wastes. In 1959, soil contaminated with Ac-227 and Ra-226 was deposited near an abandoned septic tank that was located near Building 29 in the northeast section of Area 7. The septic tank historically had received only sanitary waste from the administrative buildings at the Mound Plant between 1946 and 1952. The septic tank was taken out of service and abandoned in 1952. The exact location of the septic tank was not known when the project began.

Information gleaned from plant staff interviews and limited written records indicated that three dump-truck loads of contaminated soil were deposited in or around the abandoned septic tank. Results from previous sampling efforts showed elevated levels of Ac-227 and Ra-226 in the soil near the suspected location of the abandoned septic tank, as well as elevated levels of Ra-226 in the soil downgradient from the suspected location of the abandoned septic tank.

Prior to commencement of the pilot, the response action was focusing on removal of the septic tank, rather than the contaminated soil. A full site characterization was proposed to locate the tank prior to implementing the response.

Remediation Progress

- ‣ The conceptual model helped to focus the response action on the contaminated soil instead of the tank. This refocused effort made a significant difference in the nature and scope of the removal action, enabling the project team to focus on the elements of the site that posed a threat to human health and the environment.

- ‣ The site team and SAFER technical team worked together to develop the basic design approach, removal goals, and preliminary decision rules. The conceptual model became the basis of a revised action memorandum and work plan.

- ‣ The Area 7 soil excavation removal action is now complete.

Measures of Success

- ♦ The conceptual model helped to refocus the removal action from tank removal to contaminated soil removal, making it unnecessary to locate the tank prior to commencing action. (The location of the boundaries of the contaminated soil was already known.)

- ♦ Through careful planning and analysis of uncertainties, the site team became convinced that the originally proposed site characterization, estimated to cost more than $300,000, was not necessary prior to implementing the response.

- ♦ DOE Mound credits the SAFER technical team with significantly improving the technical quality of the work plan, resulting in increased clarity of technical issues and implementable design parameters.

New Properties Transfer

Site Description

The New Properties site consisted of property that was purchased in 1981 as a buffer area between the Mound Plant and the City of Miamisburg, Ohio. No DOE operations were ever conducted on the "new Properties." Prior to DOE ownership, the new properties were used as agricultural land. DOE now wants to release the new properties to the City of Miamisburg for industrial development.

Thorium redrumming was performed at the Mound Plant in an area adjacent to the new properties. The thorium redrumming activities, which include the handling and disposal of thorium, are well documented. Previous sampling efforts indicated the potential for limited migration of thorium onto the new properties. No other potential releases of hazardous substances are known.

Remediation Progress

- ‣ The SAFER technical team developed a land transfer strategy for the new properties and identified a formal approval method (i.e., "intent to transfer" letter) that ultimately led to formal EPA approval of the property transfer. The transfer strategy suggested a phased approach: transfer of the clean area to precede transfer of the potentially contaminated area.

- ‣ By fully integrating the City of Miamisburg as a key stakeholder in the decision-making process, Mound was able to receive timely feedback and approval of its land transfer strategy.

- ‣ Decision-rule logic was applied to confirm data sufficiency for determining that the first 500 ft. were sufficiently clean to transfer without further action.

Measures of Success

- ♦ EPA has approved transfer of the Mound property to the City of Miamisburg. This property transfer represents DOE's first successful effort at certifying property as clean and receiving approval from EPA to relinquish responsibility to a local municipality.

♦ Mound and the City of Miamisburg were so satisfied with the land transfer strategy that Mound has requested additional assistance to support the transfer of the balance of the property. The SAFER technical team has been asked to help develop the risk assessment strategy and future data collection requirements for the remaining property.

> *The fact that HQ was willing to send good people to help us in the field was very much appreciated.*
> Art Kleinrath, DOE Mound

5.4 HANFORD

Site Description

The 100-BC Reactor Area was selected as the Hanford SAFER pilot site. The 100-BC Reactor Area contains two source OUs, 100-BC-1 and 100-BC-2, and one groundwater OU, 100-BC-5. The 100-BC OUs were listed on the NPL in 1989.

The 100-BC OUs are located approximately 30 miles northwest of the city of Richland, Washington, on the shoreline of the Columbia River. The 100-BC-5 groundwater OU underlies the 100-BC-1 and 100-BC-2 source OUs, which together comprise the entire 100-BC Reactor Area. Groundwater flows directly into the Columbia River, which is approximately one-half mile from the B and C reactors.

The Hanford SAFER pilot focused specifically on one of the OUs contained within the 100-BC Area: the reactor liquid effluent OU, 100-BC-1. The 100-BC-1 OU received liquid and solid wastes resulting from the B Reactor operations, and contains 44 individual waste sites. These waste sites include cribs, trenches, retention basins, burial grounds, pipelines, river outfall structures, and septic tanks. Contaminants of concern are fission products (primarily Cs-137, Co-60, Sr-90, Eu-152, and Eu-154), metals (Cr), and inorganics (nitrous oxide). The 100-BC-1 OU received approximately 183 million liters of radioactive/hazardous liquid wastes and 40 cubic meters of solid waste.

The FFA between DOE, EPA, and Washington Department of Ecology incorporates the provision that all of the OUs in the 100-BC Area be grouped together and addressed comprehensively in one RI/FS, ROD, and Remedial Design. When the pilot began, the 100-BC Area was transitioning from the RI/FS stage to the RD/RA stage of the response.

Remediation Progress

- DOE, EPA, and the State agreed to use a two-pronged approach to resolving some of the uncertainties inherent in the remediation of the 100-BC Area. The first stage of the response would require a demonstration project using CERCLA removal authority; the second stage would include development of an overall design document for the 100-BC Area.

- The demonstration project was designed to help bracket the costs and limit the uncertainties inherent in the response actions. The SAFER technical team helped to develop and design the scope of the demonstration project. Remediation goals and decision rules were developed; an uncertainty management plan, including potential deviations and contingencies, was developed to help manage the uncertainty inherent in the removal action.

- The demonstration project, which encompassed three waste sites, met all its objectives. The site team now fully acknowledges the value of uncertainty management, including the identification of potential deviations and contingencies. Although such a plan had been developed prior to implementation of the demonstration project, the plan was never incorporated into the field operations. Several of the deviations identified in the plan actually materialized during the demonstration project; implementation of the contingencies would have eliminated the need for a month and a half long work stoppage
.
- The second stage of the response will rely on a comprehensive remedial design of the 100-BC Area. The design is scheduled for completion in March, 1996, and relies heavily on the conceptual model and decision rules developed by the Extended Project Team. Information gathered during the demonstration project is feeding directly into the design document.

> *The SAFER team is an invaluable sounding board, providing insights into HQ guidance and experiences at other DOE sites.*
> Rick Donahoe, Remedial Design Team Lead for 100-BC Reactors

Measures of Success

♦ The regulators were an integral part of the Extended Project Team for the 100-BC Area response. Such a high value was placed on early and active stakeholder involvement that formalized partnering has now been extended to the entire 100-BC Area.

> *SAFER removes politics from the decision-making process. It builds team spirit and provides an opportunity to voice concerns. DOE has moved more quickly because of SAFER.*
> Ted Wooley, Washington Dept. of Ecology

- ♦ As a result of decision rules and the role played by the SAFER technical team, the demonstration project was completed on schedule; they expect to complete the overall design document in March, 1996.

6. OTHER NON-PILOT SAFER ACTIVITIES

> *Since February 1995, at least two months and $200,000 have been saved because of SAFER and the SAFER technical team. The confidence that ERC, DOE, and the regulators have in SAFER allows us to sit down together and come to resolution quickly.*
> Rick Donahoe, Remedial Design Team Lead for 100-BC Reactors

There are at least three other sites that were not formally part of the SAFER pilots, but nonetheless used SAFER tenets to ensure remedial progress. These sites are discussed in this report because they help illustrate SAFER's broad applicability and high success rate. The three projects discussed below are: (1) the Ventron FUSRAP Site; (2) a solid waste burial ground at Hanford (118-B-1); and (3) the Bear Creek Valley Site at Y-12 in Oak Ridge. These three SAFER-supported projects do not fit neatly into the SAFER pilot criteria agreed upon between EPA and DOE. The Ventron site is not listed on the NPL; the 118-B-1 project was a treatability study; the Bear Creek Valley Site was implemented independently by Oak Ridge, without delegated signature authority to the Oak Ridge Field Office. In addition, the Idaho National Engineering Laboratory (INEL) "Bias for Action" is summarized briefly as an illustration of other streamlining approaches being implemented at sites throughout the DOE complex.

6.1 HANFORD 118-B-1 BURIAL GROUND TREATABILITY STUDY

Site Description

The 118-B-1 Burial Ground at Hanford consists of approximately 20 trenches in a seven-acre parcel. The Burial Grounds were used primarily as a disposal site for radiologically contaminated wastes from the 105-B Reactor at Hanford, although historical records indicate that the Burial Ground contains a great variety of waste forms. Some of the wastes were segregated into specific trenches during disposal. Typical wastes reported to be present in the Burial Ground include aluminum tubing; gloves, booties, and other personal protective clothing; lead and steel piping; lead shielding and bricks; and paper and cardboard.

EPA requested that DOE perform a treatability study on this site to determine the feasibility of excavating, analytically screening, and handling 5,000 to 10,000 cubic yards of waste material, while relying on existing technologies. The 118-B-1 Burial Ground was selected for the study because of the availability of historical data for the site and because the site was believed to be representative of other primary-use burial grounds in the 100 Area.

June 20, 1995

Nicole Kimball
Environmental Protection Specialist
U.S. Department of Energy
P.O. Box 550 H4-83
Richland, Washington 99352

Re: Review of 118-B-1 Burial Ground Excavation Treatability Test Report

Dear Ms. Kimball:

The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) have completed our review of the 118-B-1 Burial Ground Excavation Treatability Test Report.

This document is well written and clearly conveys the purpose and information gained during this test. The success of the test is a good indicator that the work done upfront as part of the Streamlined Approach for Environmental Restoration (SAFER) was a clear benefit to the project.

It is EPA and Ecology's observation that information gained in this test will result in a more efficient transition into burial ground remediation. This information will also be beneficial while writing the record of decisions for the first burial grounds.

The EPA and Ecology recommend the U.S. Department of Energy finalize this document as written. If you have any questions or concerns feel free to contact me at (509) 376-8631.

Sincerely,
Dennis Faulk
Operable Unit Manager

cc: Wayne Soper, Ecology
Mark Sturges, BHI
Administrative Record (100-BC-2 OU)

Remediation Progress

- Decision rules were used to develop a consensus on the inappropriateness of digging pits to determine the depth and boundaries of the contamination at the Burial Ground.

- Stakeholder involvement and consensus building were used to reach agreement on the Statement of Work (SOW) for the treatability study. The conceptual model enabled DOE to maintain the focus of the SOW on determining the feasibility of mechanically excavating and separating different waste forms at the site.

- Consensus building helped achieve concurrence on the treatability test plan and test procedures needed to train work crews prior to initiation of field work.

Measures of Success

- The SOW had been in contention for more than a year. By utilizing the SAFER tenets, a binding work scope agreement was developed within five days that included clearly defined assumptions upon which to develop costs and schedules. Very few changes in the test plan and procedures were required due to the well defined work scope.

- Translation of the conceptual model into field activity was able to occur on an unprecedented schedule. The work scope concept was finalized in January, 1994, and excavation into the highly radioactive burial ground began in August, 1994.

- The contribution to the treatability study SOW was so significant that similar assistance was requested from the SAFER technical team to address issues at two N Reactor trenches.

> *The successes of the 118-B-1 Burial Ground Excavation Treatability Test are directly related to use of SAFER for defining, then meeting or exceeding, all decision-maker's expectations.*
> Roger Freeberg, Richland Operations

6.2 VENTRON SITE (FUSRAP)

Site Description

The three-acre Ventron site, in Beverly, Massachusetts, was used from 1942 to 1948 to produce uranium metal from uranium oxide and other materials. Radioactive contamination of soils, interior and exterior building surfaces, and equipment surfaces were initially addressed through a decontamination and decommissioning (D&D) effort in 1948, which cleaned the site to the environmental standards that prevailed at that time. Two subsequent radioactivity surveys (1977 and 1980), however, indicated contamination remained above current FUSRAP standards. A site characterization plan drafted in March, 1992, proposed an extensive sampling and analysis effort aimed at generally characterizing the residual contamination at the site.

Remediation Progress

- A conceptual model and uncertainty analysis were used in August, 1992, to revise the characterization plan. Several boring holes and soil samples were eliminated or postponed until the buildings located above the contaminated soil were scheduled to be demolished. Similarly, visual evidence of cracked floors and other tell-tale signs were relied on to identify likely areas of contamination.

Measures of Success

- ♦ The SAFER tenets produced a better targeted and less expensive site characterization plan that would provide a greater understanding of the site for less resources. By focusing on specific data needs, it was possible to eliminate certain types of samples, such as those taken generally around drains and sumps.

- ♦ The revised characterization plan resulted in a 35 percent reduction in the number of samples and a commensurate reduction in the cost of the site characterization.

6.3 BEAR CREEK VALLEY SITE - Y-12 PLANT OAK RIDGE

Site Description

Bear Creek Valley, located to the west of the Y-12 Plant on the Oak Ridge Reservation, is the site of eight waste disposal areas that were in operation from the early 1940s through the mid-1980s. The Valley has contaminated soil, groundwater, surface water, and sediments. Until recently, contaminated sites in Bear Creek Valley had been categorized into two types of operable units: source term OUs that addressed the waste disposal areas, and an integrator OU that addressed contamination that had migrated from the sources to environmental media. Because of the complexity of the interactions between the source term and integrator OUs, it was difficult to evaluate the OUs independently.

Remediation Progress

- A revised conceptual model consolidated the OUs in Bear Creek Valley to incorporate all waste disposal areas, soils, groundwater, surface water, and sediments.

- Priorities for action could now be based on relative risk to human health and the environment, and inconsistent and potentially technically unsound actions could be avoided.

- The RI/FS for the new OU is being expedited by moving forward with existing data.

Measures of Success

- ♦ OR estimates that $10.3 million was saved over four years, and the remediation schedule was reduced by at least two years through the use of the revised conceptual model, decision rules, and contingency planning, which enabled the project team to maximize use of existing data, and accept and effectively manage higher levels of uncertainty.

6.4 THE INEL "BIAS FOR ACTION" APPROACH

In addition to SAFER, other streamlining approaches to environmental restoration are being implemented at sites throughout the DOE complex. The environmental restoration program at the Idaho National Engineering Laboratory (INEL) is one example. The INEL program includes the key elements of SAFER: application of DQOs and the Observational Approach during assessment and cleanup; frequent interaction with regulators and other stakeholders; and a bias for action to cleanup facilities as quickly as possible.

Using its SAFER-like streamlined approach, INEL met all 27 FFA-enforceable milestones required through the end of FY94.

7. SUMMARY AND CONCLUSIONS

The SAFER pilots have shown to varying degrees that use of the SAFER tenets can make a significant difference in the way environmental restoration is implemented throughout the DOE complex. Each of these pilots were in different stages of response and presented different challenges, but all were successful to some extent in saving time and money and in improving the decision-making process. Federal and State regulators have expressed unanimous support for the SAFER process, and are especially pleased with the opportunity to provide early input and obtain a fuller understanding of the site decisions.

The SAFER pilots demonstrated several important lessons:

- Early communication of issues and concerns held by regulators and site personnel facilitates consensus building;

- Consensus building among all stakeholders is critical to ensuring that false starts are minimized and that ultimate approval is obtained;

- SAFER helps to focus on, and in some cases, separate complex issues in a manner that expedites cleanup;

- SAFER helps ensure that the availability of or need for data that could directly benefit characterization of the critical issues at the site is documented; and

- Success ultimately depends on the existence of a "champion" at the site capable of successfully driving the SAFER process.

U.S. DEPARTMENT OF ENERGY
POINTS-OF-CONTACT TO CHAMPION THE PRINCIPLES OF THE
STREAMLINED APPROACH FOR ENVIRONMENTAL RESTORATION

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